

## **APPENDIX C**

### **Partition Coefficients For Cadmium**

## Appendix C

### Partition Coefficients For Cadmium

#### C.1.0 Background

Cadmium  $K_d$  values and some important ancillary parameters that have been shown to influence cadmium sorption were collected from the literature and tabulated. Data included in this data set were from studies that reported  $K_d$  values and were conducted in systems consisting of

- Natural soils (as opposed to pure mineral phases)
- Low ionic strength solutions ( $<0.1$  M)
- pH values between 4 and 10
- Solution cadmium concentration less than  $10^{-5}$  M
- Low humic materials concentrations ( $<5$  mg/l)
- No organic chelates (such as EDTA)

A total of 174 cadmium  $K_d$  values were found in the literature (see summary in Section C.3.0). At the start of the literature search, attempts were made to identify  $K_d$  studies that included ancillary data on aluminum/iron-oxide concentrations, calcium and magnesium solution concentrations, pH, cation exchange capacity (CEC), clay content, redox status, organic matter concentrations and sulfide concentrations. Upon reviewing the data and determining the availability of cadmium  $K_d$  measurements having ancillary information,  $K_d$  values were collected that included information on clay content, pH, CEC, total organic carbon (related to organic matter), and dissolved cadmium concentrations. The selection of these parameters was based on availability of data and the possibility that the parameter may impact cadmium  $K_d$  values. Of the 174 cadmium  $K_d$  values included in our tabulation, 62 values had associated clay content data, 174 values had associated pH data, 22 values had associated CEC data, 63 values had total organic carbon data, 172 values had associated cadmium concentration data, and 16 had associated aluminum/iron-oxide data. The descriptive statistics for this total set of cadmium  $K_d$  values are listed in Table C.1.

**Table C.1.** Descriptive statistics of the cadmium  $K_d$  data set for soils.

	Cadmium $K_d$ (ml/g)	Clay Content (wt.%)	pH	CEC (meq/100g)	TOC (mg/l)	Cd Conc. (mg/l)	Fe Oxides (wt.%)
Mean	226.7	14.2	5.88	21	5.5	3.67	1.32
Standard Error	44.5	1.7	0.09	3	0.85	0.48	0.53
Median	121.8	10.24	5.83	23	2.0	0.01	0.38
Mode	80.0	6	6.8	2	0.4	0.01	0.19
Std. Dev	586.6	13.5	1.16	15	6.8	6.27	2.12
Sample Variance	344086	182	1.34	245	45.9	39.4	4.51
Range	4359	86.2	6.20	58	32.4	34.9	8.28
Minimum	0.50	.9	3	2	0.2	0.01	0.01
Maximum	4360	87.1	9.2	60	32.6	35	8.29
No. Samples	174	62	174	22	63	172	16

## **C.2.0 Approach and Regression Models**

### ***C.2.1 Correlations with Cadmium $K_d$ Values***

Linear regression analyses were conducted between the ancillary parameters and cadmium  $K_d$  values. The correlation coefficients from these analyses are presented in Table C.2. These results were used for guidance for selecting appropriate independent variables to use in the look-up table. The largest correlation coefficient was between pH and  $\log(K_d)$ . This value is significant at the 0.001 level of probability. Attempts at improving this correlation coefficient through the use of additional variables, *i.e.*, using multiple-regression analysis, were not successful. Multiple regression analyses were conducted with the following pairs of variables to predict cadmium  $K_d$  values: total organic carbon and pH, clay content and pH, total organic carbon and iron-oxides, and pH and CEC.

**Table C.2.** Correlation coefficients (r) of the cadmium  $K_d$  data set for soils.

	Cadmium $K_d$	log ( $K_d$ )	Clay Content	pH	CEC	TOC	Cd Conc.
Cadmium $K_d$	1						
log ( $K_d$ )	0.69	1					
Clay Conc.	-0.04	0.03	1				
pH	0.50	0.75	0.06	1			
CEC	0.40	0.41	0.62	0.35	1		
TOC	0.20	0.06	0.13	-0.39	0.27	1	
Cd Conc.	-0.02	-0.10	-0.39	0.22	-0.03	-0.09	1
Fe Oxide Conc.	0.18	0.11	-0.06	0.16	0.19	0.18	0.01

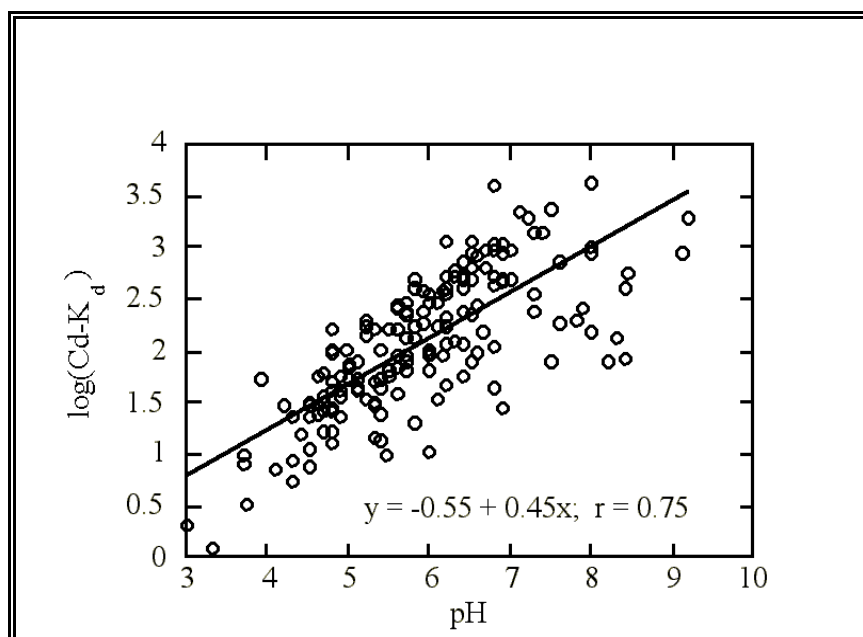
### ***C.2.2 Cadmium $K_d$ Values as a Function of pH***

The cadmium  $K_d$  values plotted as a function of pH are presented in Figure C.1. A large amount of scatter exists in these data. At any given pH, the range of  $K_d$  values may vary by 2 orders of magnitude. This is not entirely satisfactory, but as explained above, using more than 1 variable to help categorize the cadmium  $K_d$  values was not fruitful.

The look-up table (Table C.3) for cadmium  $K_d$  values was categorized by pH. The regression equation for the line presented in Figure C.1 is:

$$Cd\ K_d = -0.54 + 0.45(pH). \quad (C.1)$$

The minimum and maximum values were estimated based on the scatter of data points observed in Figure C.1.



**Figure C.1.** Relation between cadmium  $K_d$  values and pH in soils.

**Table C.3.** Look-up table for estimated range of  $K_d$  values for cadmium based on pH. [Tabulated values pertain to systems consisting of natural soils (as opposed to pure mineral phases), low ionic strength (< 0.1 M), low humic material concentrations (<5 mg/l), no organic chelates (such as EDTA), and oxidizing conditions.]

$K_d$ (ml/g)	pH		
	3 - 5	5 - 8	8 - 10
Minimum	1	8	50
Maximum	130	4,000	12,600

### C.3.0 Data Set for Soils

Table C.4 lists the available  $K_d$  values for cadmium identified for experiments conducted with only soils. The  $K_d$  values are listed with ancillary parameters that included clay content, pH, CEC, TOC, solution cadmium concentrations, and iron-oxide concentrations

**Table C.4.** Cadmium  $K_d$  data set for soils.

Cd $K_d$ (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
52.5	54.7	4.8	30.2	1.54	1	0.33	0.005 M CaNO <sub>3</sub>	Alligator Ap	Converted Freund. to $K_d$ Using 1ppm	1
288.4	8.3	5.7	2	0.61	1	0.1	0.005 M CaNO <sub>3</sub>	Cecil Ap	Converted Freund. to $K_d$ Using 1ppm	1
13.9	51.2	5.4	2.4	0.26	1	0.08	0.005 M CaNO <sub>3</sub>	Cecil B	Converted Freund. to $K_d$ Using 1ppm	1
186.6	0.9	5.9	22.54	6.62	1	1.68	0.005 M CaNO <sub>3</sub>	Kula Ap1	Converted Freund. to $K_d$ Using 1ppm	1
52.7	17.6	3.9	26.9	11.6	1	1.19	0.005 M CaNO <sub>3</sub>	Lafitte Ap	Converted Freund. to $K_d$ Using 1ppm	1
91.2	28.2	6	11	1.67	1	0.19	0.005 M CaNO <sub>3</sub>	Molokai Ap	Converted Freund. to $K_d$ Using 1ppm	1
28.8	2.8	6.9	4.1	0.21	1	0.06	0.005 M CaNO <sub>3</sub>	Norwood Ap	Converted Freund. to $K_d$ Using 1ppm	1
97.9	6.2	6.6	8.6	0.83	1	0.3	0.005 M CaNO <sub>3</sub>	Olivier Ap	Converted Freund. to $K_d$ Using 1ppm	1
5.5	3.8	4.3	2.7	1.98	1	0	0.005 M CaNO <sub>3</sub>	Spodisol	Converted Freund. to $K_d$ Using 1ppm	1
755.1	23.9	7.6	48.1	4.39	1	0.19	0.005 M CaNO <sub>3</sub>	Webster Ap	Converted Freund. to $K_d$ Using 1ppm	1

Cd K <sub>d</sub> (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
14.4	2.8	5.3	2	2.03	1	0.42	0.005 M CaNO <sub>3</sub>	Windsor Ap	Converted Freund. to K <sub>d</sub> Using 1ppm	1
87.1		8.4	60	1.44	1	1.07	Water	Vertic Torrifluvent	Converted Freund. to K <sub>d</sub> Using 1ppm	2
33.88		5.2	33.8	32.6	1		Water	Organic	Converted Freund. to K <sub>d</sub> Using 1ppm	2
20.42		5.8	23.8	3	1	8.29	Water	Boomer, Ultic Haploxeralf	Converted Freund. to K <sub>d</sub> Using 1ppm	2
10.47		6	25	3.2	1	1.07	Water	UlticPalexeralf	Converted Freund. to K <sub>d</sub> Using 1ppm	2
80		8.2	8.2	0.21	35		0.01 M NaCl	Gevulot	Calc. Fig 1.	3
200		7.8	15.4	0.83	25		0.01 M NaCl	Bet Yizhaq	Calc. Fig 1.	3
133.3		8.3	18.9	0.23	30		0.01 M NaCl	Gilat	Calc. Fig 1.	3
181.8		7.6	31.8	0.79	25		0.01 M NaCl	Maaban Michael	Calc. Fig 1.	3
266.7		7.9	37	0.86	15		0.01 M NaCl	Hahoterim	Calc. Fig 1.	3
8	8	3.7		1.6	11.2		0.01 M NaNO <sub>3</sub>	Downer Loamy Sand		4
17	8	4.8		1.6	11.2		0.01 M NaNO <sub>3</sub>	Downer Loamy Sand		4
32	8	5.3		1.6	11.2		0.01 M NaNO <sub>3</sub>	Downer Loamy Sand		4
64	8	6		1.6	11.2		0.01 M NaNO <sub>3</sub>	Downer Loamy Sand		4
92	8	6.2		1.6	11.2		0.01 M NaNO <sub>3</sub>	Downer Loamy Sand		4
110	8	6.8		1.6	11.2		0.01 M NaNO <sub>3</sub>	Downer Loamy Sand		4
250	8	7.3		1.6	11.2		0.01 M NaNO <sub>3</sub>	Downer Loamy Sand		4

Cd K <sub>d</sub> (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
580	8	8.5		1.6	11.2		0.01 M NaNO <sub>3</sub>	Downer Loamy Sand		4
0.5	6	3.1		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
3.3	6	3.8		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
7.5	6	4.5		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
10	6	5.5		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
34	6	6.1		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
45	6	6.8		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
80	6	7.5		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
150	6	8		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
420	6	8.4		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
900	6	9.1		0.4	11.2		0.01 M NaNO <sub>3</sub>	Freehold Sandy Loam A Horizon		4
2.1	13	3		16.8	11.2		0.01 M NaNO <sub>3</sub>	Boonton Loam		4
10	13	3.7		16.8	11.2		0.01 M NaNO <sub>3</sub>	Boonton Loam		4
30	13	4.2		16.8	11.2		0.01 M NaNO <sub>3</sub>	Boonton Loam		4
57	13	4.6		16.8	11.2		0.01 M NaNO <sub>3</sub>	Boonton Loam		4



<b>Cd K<sub>d</sub></b> <b>(ml/g)</b>	<b>Clay</b> <b>Cont.</b> <b>(wt%)</b>	<b>pH</b>	<b>CEC</b> <b>(meq/</b> <b>100 g)</b>	<b>TOC</b> <b>(wt%)</b>	<b>[Cd]</b> <b>(mg/l)</b>	<b>Fe</b> <b>Oxides</b> <b>(wt.%)</b>	<b>Solution</b>	<b>Soil</b> <b>Identification</b>	<b>Comments</b>	<b>Ref.<sup>a</sup></b>
101	13	5		16.8	11.2		0.01 M NaNO <sub>3</sub>	Boonton Loam		4
195	13	5.2		16.8	11.2		0.01 M NaNO <sub>3</sub>	Boonton Loam		4
420	13	5.8		16.8	11.2		0.01 M NaNO <sub>3</sub>	Boonton Loam		4
1,200	13	6.2		16.8	11.2		0.01 M NaNO <sub>3</sub>	Boonton Loam		4
4,000	13	6.8		16.8	11.2		0.01 M NaNO <sub>3</sub>	Boonton Loam		4
1.2	16	3.3		9.8	11.2		0.01 M NaNO <sub>3</sub>	Rockaway Stony Loam		4
7.1	16	4.1		9.8	11.2		0.01 M NaNO <sub>3</sub>	Rockaway Stony Loam		4
27	16	4.8		9.8	11.2		0.01 M NaNO <sub>3</sub>	Rockaway Stony Loam		4
53	16	5.1		9.8	11.2		0.01 M NaNO <sub>3</sub>	Rockaway Stony Loam		4
170	16	5.6		9.8	11.2		0.01 M NaNO <sub>3</sub>	Rockaway Stony Loam		4
300	16	6.1		9.8	11.2		0.01 M NaNO <sub>3</sub>	Rockaway Stony Loam		4
390	16	6.2		9.8	11.2		0.01 M NaNO <sub>3</sub>	Rockaway Stony Loam		4
910	16	6.5		9.8	11.2		0.01 M NaNO <sub>3</sub>	Rockaway Stony Loam		4
1,070	16	6.8		9.8	11.2		0.01 M NaNO <sub>3</sub>	Rockaway Stony Loam		4
43	10	4.8		2.4	11.2		0.01 M NaNO <sub>3</sub>	Fill Material - Delaware River		4
67	10	5.7		2.4	11.2		0.01 M NaNO <sub>3</sub>	Fill Material - Delaware River		4
130	10	6.3		2.4	11.2		0.01 M NaNO <sub>3</sub>	Fill Material - Delaware River		4

Cd K <sub>d</sub> (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
150	10	6.7		2.4	11.2		0.01 M NaNO <sub>3</sub>	Fill Material - Delaware River		4
370	10	7.3		2.4	11.2		0.01 M NaNO <sub>3</sub>	Fill Material - Delaware River		4
880	10	8		2.4	11.2		0.01 M NaNO <sub>3</sub>	Fill Material - Delaware River		4
1,950	10	9.2		2.4	11.2		0.01 M NaNO <sub>3</sub>	Fill Material - Delaware River		4
1,000	12	8			1	3.7	Carbonate Groundwater r	Interbed	pH of Groundwater	5
4,360	12.4	8			1	2.5	Carbonate Groundwater r	Alluvium	pH of Groundwater	5
536.8	25.2	6.8	27.5				0.01 M NaCl	Soil A	Desorption	6
440	25.2	6.8	27.5				0.01 M NaCl	Soil A	Desorption	6
9		4.3			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
23.4		4.3			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
15.8		4.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
11.3		4.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
31.2		4.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
32.5		4.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
23		4.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
17.1		4.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
13.1		4.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K <sub>d</sub> (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
24.9		4.6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
26.8		4.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
36.2		4.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
32.9		4.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
37.2		4.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
29.2		4.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
28.3		4.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
22.6		4.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
37.4		4.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
40.9		4.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
63.5		4.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
25.2		5.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
29.9		5.3			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
33.7		5.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
44.3		5.1			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
42.8		5.1			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
53.5		5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
56.2		4.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
68.7		5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K <sub>d</sub> (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
82.3		5.1			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
75.7		5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
95.2		4.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
103		4.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
160		4.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
43.3		5.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
55.2		5.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
52.2		5.3			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
40.3		5.6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
56.1		5.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
67.5		5.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
102.9		5.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
164.4		5.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
163.8		5.3			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
202.1		5.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
172.4		5.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
149		5.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
72.8		5.6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
81.6		5.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K <sub>d</sub> (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
90		5.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
94.3		5.6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
48.1		6.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
56.5		6.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
81		6.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
122.3		6.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
121.4		6.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
101.5		6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
99.3		6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
107.8		6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
219.5		6.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
179.2		6.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
177		6.1			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
360.4		6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
305.2		6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
236.8		5.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
186.3		5.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
174.8		5.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
138.7		5.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K <sub>d</sub> (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
132.5		5.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
375.6		5.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
403.3		5.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
510.8		5.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
225.9		5.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
227.3		5.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
248		5.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
253.1		5.6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
277.2		5.6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
240.7		6.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
227.8		6.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
281.1		6.6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
551.2		6.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
519.8		6.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
418.7		6.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
353.7		6.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
400.8		6.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
609.2		6.3			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
545.7		6.3			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K <sub>d</sub> (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
515.9		6.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
545.7		6.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
760.9		6.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
665.7		6.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
503.2		6.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
515.2		7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
488.9		6.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
481		6.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
461.6		6.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
1,151		6.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
868.7		6.6			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
637.2		6.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
970.9		6.7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
950.5		6.8			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
886.2		6.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
1,106		6.9			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
970.9		7			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
2,248		7.1			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
1,909		7.2			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K <sub>d</sub> (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref. <sup>a</sup>
1,411		7.3			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
1,383		7.4			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
2,337		7.5			0.01		0.001M CaCl <sub>2</sub>	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
a 1 = Buchter <i>et al.</i> , 1989; 2 = Garcia-Miragaya, 1980; 3 = Navrot <i>et al.</i> , 1978; 4 = Allen <i>et al.</i> , 1995; 5 = Del Debbio, 1991; 6 = Madrid <i>et al.</i> , 1992; 7 = Anderson and Christensen, 1988										

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